

## EMERGENCE TRAP AND COLLECTING APPARATUS FOR CAPTURE OF INSECTS EMERGING FROM SOIL<sup>1</sup>

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**ABSTRACT:** Common materials are used to construct an emergence trap and collecting apparatus for studying cecidomyiid emergence. Trap design minimizes temperature, humidity, and photoperiod differences between trap interior and surrounding conditions. Trapped insects are easily retrieved alive with the collecting apparatus described.

To study emergence periods of the balsam gall midge, *Paradiplosis tumifex* Gagné (Diptera: Cecidomyiidae) and its parasites from the soil, we designed and constructed a trap and collecting apparatus which may be left in the field for an extended period of time. Southwood and Siddorn (1965) stressed the need for insect emergence traps that do not create microclimates different from surrounding conditions. Such microclimates may produce inaccurate data on emergence periods. Also, emergence traps must not contain insecticides or insecticide residues from previous attempts to immobilize trapped insects. In this paper we describe a soil emergence trap constructed of common materials that does not create microclimates or utilize insecticides. We also describe a collecting apparatus which permits the efficient retrieval of live insects if desired.

Waede (1960) described a metal emergence trap with a silk gauze top which permitted water penetration and air circulation. A collecting jar fitted with a cone was screwed into one side of the trap. Thirty minutes before taking each collection, the trap was covered with tar paper so positively phototactic insects would move into the jar.

Our wooden trap was modeled from his design. Each trap frame was cut from 1.9 x 19.7 cm (1 x 8 in) pine and measured 64.7 x 30.5 x 19.7 cm in height (Fig. 1). Nylon "no-see-um"<sup>®</sup> netting<sup>2</sup> covered the top; the bottom was open. The trap was covered with 1.3 cm (1/2 in) hardware cloth to prevent animals or falling objects from damaging the netting. A 7.0 cm hole was drilled in one side of the trap, and a Ball<sup>®</sup> jar lid band was fastened to the hole perimeter (Fig. 2) with four flat head screws. A wide mouth tapered pint Ball<sup>®</sup> can-or-freeze<sup>®</sup> jar was screwed into the attached jar band. No cone was used. The trap frame was inserted in topsoil to a depth of 2.5 cm, and soil was banked against the frame to seal and secure the enclosure.

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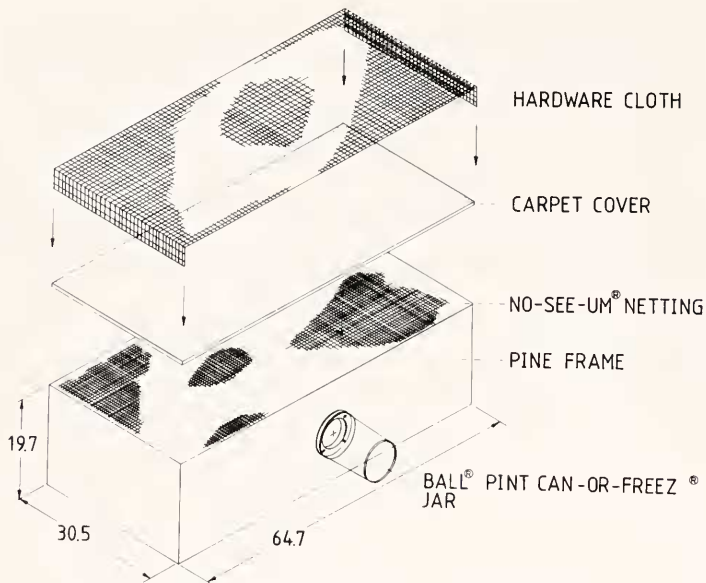


Fig. 1. Emergence trap dimensions (cm) and assembly.

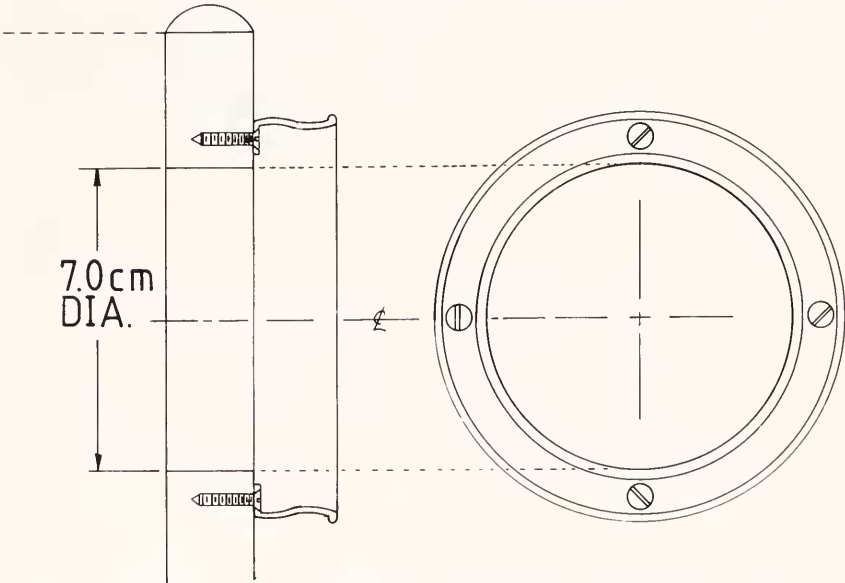


Fig. 2. Flat head screws fasten the jar band to the perimeter of a hole 7.0 cm in diameter.

The collecting apparatus consisted of a Kimble® #54100 plastic funnel and a Ball® jar lid band. The spout of the funnel was shortened to 2.5 cm; its hole was rebored to 0.635 cm. The inner rim of the band was cut in 45° increments, and the resulting sections were bent outward to provide the clearance necessary to secure the funnel to the jar (Fig. 3). These sections must be closely appressed to the funnel to prevent insects from escaping.

Carpet (65 x 31 cm) was used to darken the trap interior prior to taking collections. When we obtained a collection the funnel and band were held together with one hand; with the other hand, the jar was unscrewed from the emergence trap and quickly screwed into the funnel-band apparatus. A finger sealed the spout, but a suitable plug may be employed. Carbon dioxide gas was then released into the jar through tubing (0.95 cm) placed over the spout, which temporarily immobilized the insects. The jar and funnel were then inverted, causing the insects to tumble through the spout into vials.

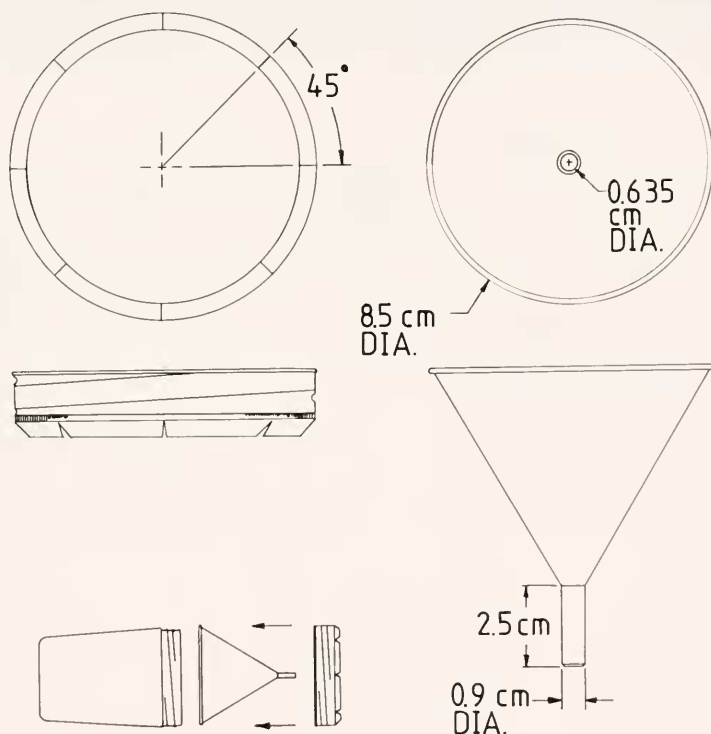


Fig. 3. Components and assembly of collecting apparatus: modified Ball® jar band, modified funnel, and assembly.

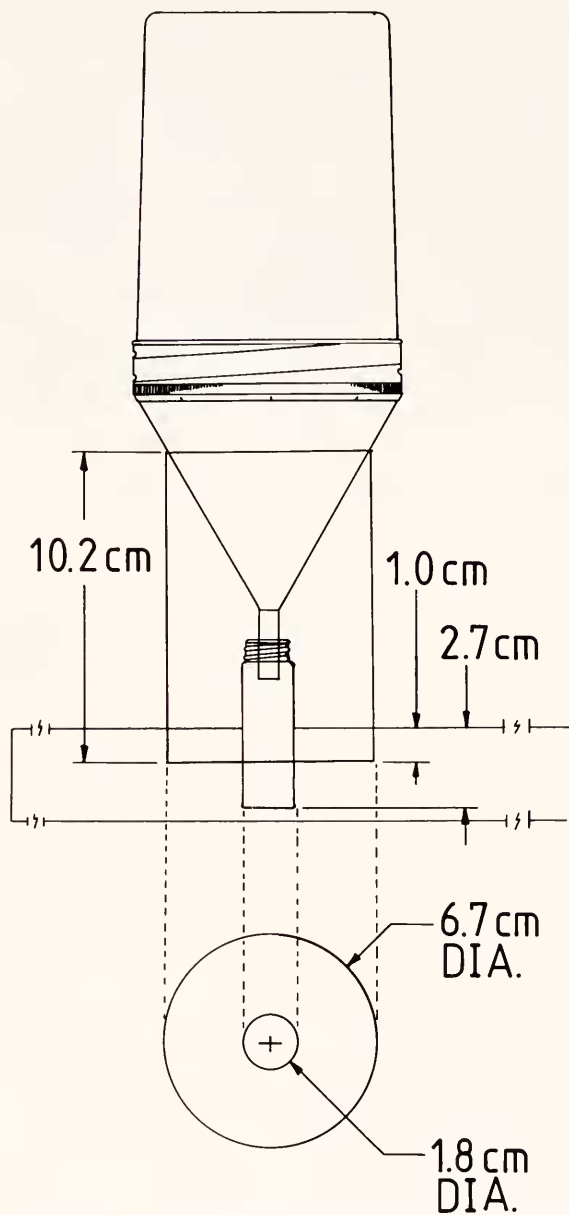


Fig. 4. Dimensions of board designed to hold target vial and metal can.

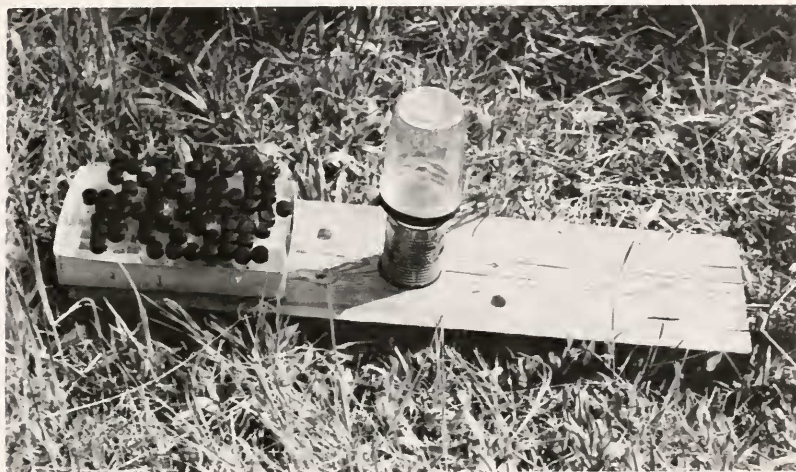


Fig. 5. Board and metal can supporting collecting apparatus.

Small insects have a tendency to adhere to the jar; they may be safely dislodged with the aid of a metal can (6.7 x 10.2 cm) and a board (Figs. 4 & 5). The board is equipped with two concentric recesses. The inner hole cradles the target vial; the outer recess (1.0 cm deep) holds an open-ended can. The depth of each recess must be adjusted so that when the funnel is inserted into the upright can, its tip extends at least 0.5 cm into the vial. The metal can prevents the funnel from being inserted so far as to stress the vial rim. A properly engineered board allows the collector to strike the plastic funnel against the metal can without danger of breaking the jar or vial and with sufficient force to dislodge insects from the jar.

The emergence trap and collecting apparatus described enabled us to obtain accurate data on emergence periods of *P. tumifex* and its parasites. The speed and ease with which trapped insects were transferred to vials make the collecting apparatus pragmatic for other entomological applications.

#### ACKNOWLEDGMENTS

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#### LITERATURE CITED

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